Challenges in Designing Regional Scale Monitoring and Evaluation Programs

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Figure 1

Challenges

- Closing the loop back to decisions
- Defining relevant data quality objectives
- Targeting key uncertainties / sources of error
- Using models to bridge gaps in data
- Using multiple lines of evidence

Figure 2

Closing the loop back to decisions

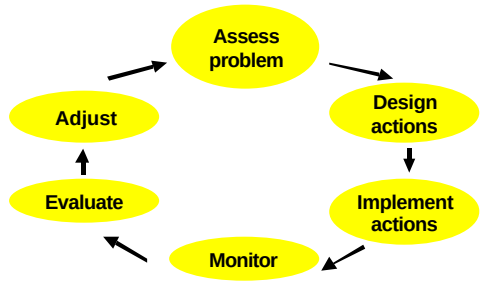

Figure 3

Data Quality Objectives

- State the problem
- Identify the decision
- Identify inputs to the decision
- Define the study boundaries
- Develop an “if-then” decision rule
- Specify limits on decision errors (both directions)
- Optimize the design for obtaining data
- See http://www.epa.gov/quality1/qs-docs/g4-final.pdf

Figure 4

Targeting key uncertainties - what benefits from reducing different types of errors?

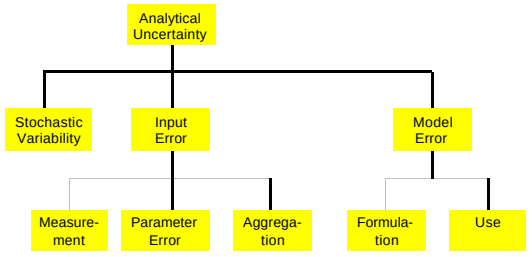

Figure 5

Bridging gaps in data with models

Space	Time: Past	Time: Present	Time: Future
Intensively studied systems; great data	• Good for understanding natural variation, sampling error, trends, cause-effect • How representative of target population?		• Continue monitoring; model future trajectories
Existing regional surveys	• May lack coverage in time, space • Provide contrasts in habitats, stressors • Often only synoptic monitoring • Assess status / trends but evaluate biases		• Improve rigor of sample • Use models to adjust for biases
Regionally representative surveys	• Such surveys almost never exist!	• Stratify target population; choose representative systems	• If sufficient $, implement monitoring
True target population	• Has target population changed over time?		• Model-based extrapolation to target population- if sufficient $, implement monitoring

Figure 6

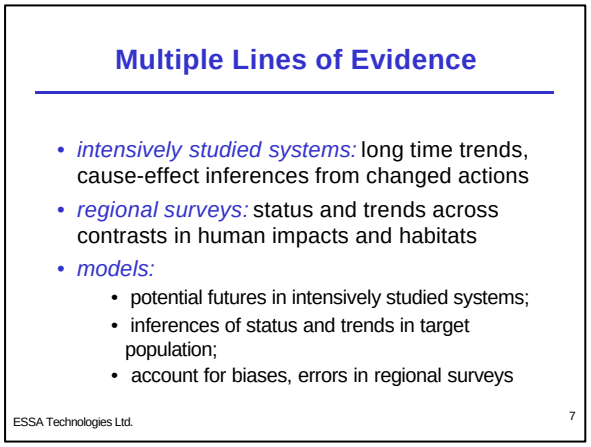
Multiple Lines of Evidence
• intensively studied systems: long time trends, cause-effect inferences from changed actions
• regional surveys: status and trends across contrasts in human impacts and habitats
• models:
• potential futures in intensively studied systems;
• inferences of status and trends in target population;
• account for biases, errors in regional surveys
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Figure 7